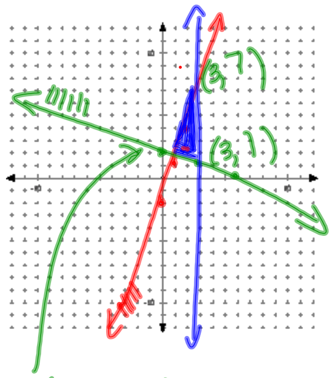
$$\begin{cases} y \le 3x - 2 \\ y \ge \frac{-1}{3}x + 2 \\ x \le 3 \end{cases}$$



List the corner points/vertices.

$y = 3x - 2$

$-\left(y = -\frac{1}{3}x + 2\right)$

$0 = 3\frac{1}{3}x - 4$

$4 = \frac{10}{3}x$

$12 = 10x$

$1.2 = x$

$1.6 = y$

$(1.2, 1.6)$

We are going to find the maximum and minimum values for a linear function for the points in the shaded region. The maximum or minimum always occurs at one of the vertices.

Complete the following table to and find the maximum and minimum values.

Vertices	f(x) = 4x – 3y	Value
3,1	12 - 3	9
3,7	12 - 21	-7
1.2,1.6	4.8 - 4.8	0

Real World Example

The goal of a linear programming problem is to maximize or minimize some objective or profit function, subject to certain constraints.

If a salon had infinite resources and an infinite market, they could cut and color hair all day for infinite profit. However, every business has certain constraints on its labor, materials, and the size of its market.

For example, a hairstylist schedules 40 minutes for a haircut and 80 minutes for a cut and color. She cannot do more than 3 cut and colors a day. The salon has 8 hours available for appointments.

You also can't have negative number of cuts, so $h \ge 0$ *and* $c \ge 0$.

$\frac{2}{3}h + \frac{4}{3}c \le 8 \qquad c \le 3$

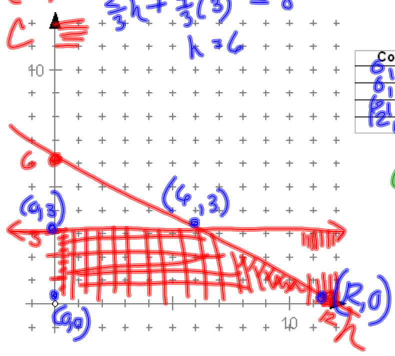
If a haircut costs $45 and a cut and color costs $100, find the best combination for the stylist to maximize her income.

$P = 45h + 100c$

(0,6) (12,0) $\frac{2}{3}h + \frac{4}{3}c \le 8$

$\frac{2}{3}h + \frac{4}{3}(3) \le 8$

$h = 6$



Corner Points	45h + 100c
0,0	$0
0,3	$300
6,3	$570
12,0	$540

6 haircuts + 3 cut/colors maximize her profit